MEMORANDUM OF AGREEMENT

between

UNITED STATES DEPARTMENT OF THE INTERIOR
AVIATION MANAGEMENT DIRECTORATE

and

US ARMY OFFICE SMALL UNMANNED AIRCRAFT SYSTEMS PROJECTS OFFICE

SUBJECT: Provide Small Unmanned Aircraft Systems (SUAS) Support to the United States Department of the Interior.

1. **PURPOSE**. The purpose of this Memorandum of Agreement (MOA) is to define the roles and responsibilities of the Department of the Interior Aviation Management Directorate (AMD) and the United States Army Small Unmanned Aircraft Systems Program Manager SUAS-PM for the loan and subsequent disposition of RQ-11A RAVEN and RQ-16 THawk III SUAS.

2. **REFERENCES**

   a. Army Regulations (AR) 750-1, Army Material Maintenance Policy and Retail Maintenance Operations, 20 Sep 07.

   b. AR 700-142, Type Classification, Material Release, Fielding, and Transfer, 26 Mar 08.

   c. DoD 41160.21-M Defense Material Disposition Manual.

   d. DOI AMD Operational Procedures Memorandum (OPM) 10-11.

3. **BACKGROUND**. In 2009, the United States Geological Survey (USGS) established a UAS Program Office and requested assistance from the U.S. Army SUAS-PM to aid the development of their program. The U.S. Army agreed to loan the UAS-PO five (5) Raven RQ-11As to help the USGS determine the viability of these systems to support USGS programs. Responsibilities for the loan were detailed in an undated Memorandum of Agreement between the UAS-PO and the USGS (Attachment 1). In addition, the SUAS-PM provided a robust spares package for use by USGS, which eventually brought the USGS inventory up to the equivalent of 19 complete RQ-11A systems.

   a. In December 2009, AMD published Operational Procedures Memorandum (OPM) 9-11, which confirmed DOI policy that UAS are considered aircraft and established AMD overall responsibility for UAS operations within the Department. While that responsibility initially focused on operator training and coordination of Federal Aviation Administration (FAA) certificates of authorization (COAs), it now includes inventory control, activity reporting using the FAIRS system, etc.

   b. In June 2011, at the request of the USGS UAS-PO, AMD requested the SUAS-PM bail 22 RQ-16 THawk III (also known as gMAV) systems, including 44 aircraft, to AMD until

such time as that agency could receive approval through appropriations language for a full transfer of these assets. That approval, as well as approval for permanent transfer of the 19 Raven-A systems, is not expected until the FY13 Interior-Environment Appropriations Bill.

4. **SCOPE.** This document establishes an agreement to loan the equivalent of 19 RQ-11A Raven and 22 RQ-16 THawk III systems, with initial spares packages, from the SUAS Product Office to DOI AMD, and specifies requirements/responsibilities associated herewith.

5. **UNDERSTANDING/AGREEMENT, SUPPORT, and RESOURCE REQUIREMENTS.** This MOA specifies support, resource requirements, and the responsibilities of each party as detailed in this paragraph. Nothing contained in this agreement shall be considered as binding the DOI-AMD or SUAS-PM to expend in any one fiscal year any sum in excess of appropriations made by Congress for the purposes of this agreement for that fiscal year, or other obligations for the further expenditure of money in excess of such appropriations. Support and resource requirements necessary to execute this agreement's provisions are as follows:

The Associate Director, DOI-AMD, Boise ID agrees to the following:

a. AMD will receive and accept property accountability for 19 sets of RQ-11A RAVEN systems, to include a Reconnaissance, Surveillance, and Target Acquisition (RSTA) kit for each system and a robust spares package. In addition, AMD accepts property accountability for 22 RQ-16 THawk III systems with associated ground support equipment and spares.

b. AMD will ensure that all UAS on loan from the SUAS-PM will only be flown and operated by trained and AMD-certified (carded) UAS operators.

c. AMD is responsible for identifying, coordinating, and funding all UAS training required for their operators and observers.

d. AMD will comply with all current and future FAA policies, procedures, and guidelines that apply to SUAS training, operator certification, and operations.

e. AMD will follow current FAA guidance, rules, and regulations relative to UAS operations in the National Air Space.

f. AMD will ensure that the Global Positioning System (GPS) cards attached to the air vehicles are accounted for and maintained under the guidelines of the GPS-Joint Project Office (JPO).

g. AMD will develop and coordinate airspace management procedures for the employment of the loaned SUAS in all operations, contingencies, and other situations.

h. AMD will conduct flight operations and perform all operator level maintenance in accordance with applicable operator manuals.

i. AMD will advise the SUAS-PM anytime an air vehicle is lost or unable to be recovered or involved in a major accident.

j. AMD will not transfer any loaned UAS systems or equipment to any agency or organization outside the Department of Interior, unless agreed to by the SUAS-PM.

When these systems are no longer needed or operable, AMD will obtain confirmation from the SUAS-PM before coordinating disposal with Defense Logistics Agency (DLA) Disposition Services.

k. AMD will coordinate for all frequency management requirements required for operation of the Raven and THawk UAS.

l. If required, AMD may develop their own contracts for maintenance, training, or other support for these systems.

m. AMD is authorized to upgrade the balled UAS with software, hardware, and sensor payloads without specific approval from the SUAS-PM.

n. DOI assumes complete liability for any loss or damage to loaned UAS equipment and incidental damage to persons or property resulting from operation of operation of these loaned systems.

o. AMD will notify SUAS-PM when the required appropriations language has been approved and initiate appropriate action through the General Services Administration (GSA) to affect a full transfer of these assets to the Department of the Interior.

The Product Manager SUAS, Redstone Arsenal, AL, agrees to the following:

p. Once AMD receives Congressional authorization to permanently transfer these systems, the SUAS Product Office will coordinate with DLA Disposition Services and the GSA FAS Pacific Rim Region Property Management Division (9QSCB) to declare these systems excess so that AMD can assume full ownership as provided under current DoD and GSA regulations.

q. The SUAS Product Office assumes no further financial responsibility for the operation, maintenance or disposition of SUAS loaned to AMD.

6. **EFFECTIVE DATE:** This MOA supersedes the previous MOA between USGS and the US Army Small Unmanned Aircraft Systems (SUAS). This agreement becomes effective upon the date of the last approving signature and will remain in effect until superseded, rescinded, or modified by mutual consent of all parties. The agreement will be reviewed as required or requested by either party above to determine the need for continuation, modification, or termination.

Mark L. Bathrick
Associate Director
Aviation Management Directorate

12-6-12
Date

Clifford R. Brandt
Product Director, SUAS
UAS Project Office

12/28/12
Date

United States Department of the Interior
National Business Center
Aviation Management
300 E. Mallard Dr., Ste 200
Boise, Idaho 83706-3991

DOI OPERATIONAL PROCEDURES (OPM) MEMORANDUM NO. 11-11

Subject: DOI Use of Unmanned Aircraft Systems (UAS)

Effective Date: December 19, 2011

Supersedes: OPM 09-11 issued on August 24, 2010

Expiration: December 31, 2012

1. **PURPOSE.** The purpose of this OPM is to provide guidance on the operations and management of Unmanned Aircraft Systems (UAS).

2. **AUTHORITY.** This policy is established by the Associate Director, Department of the Interior, Aviation Management (AM) in accordance with the provisions of Departmental Manual 112 DM 10: 350 DM 1; Secretarial Order 3250 dated September 30, 2003, and NBC Director's memorandum dated October 5, 2011.

3. **BACKGROUND.** Current FAA policy is provided in Interim Operational Approval Guidance 08-01, Unmanned Aircraft Systems Operations in the U.S. National Airspace System (NAS).

   A. FAA retains the authority to approve UAS operations within the NAS in Class A, B, C, D, E and G airspace.

   B. When operating in Class A, B, C, D, E and G airspace, DOI UAS's must be operated with a FAA Certificate of Waiver or Authorization (COA).

   C. COAs are not required in Restricted, Prohibited, or Warning airspace. However, UAS operations in these specific airspaces will be regulated and approved by the Controlling Authority (a.k.a. "Range Control").

4. **POLICY.** UAS by definition are considered aircraft. While their size, method of control, and airspace utilization procedures are different than manned aircraft, the overall responsibility for management within the Department of Interior (DOI) rests with the Aviation Management Directorate (AMD). Ownership of all aircraft, including UAS, is a function and responsibility of AMD. Additionally, AMD will coordinate with other federal agencies on use and cooperate with the FAA on existing and proposed rule making. Department of Interior bureaus shall employ the following procedures when using any UAS, either DOI-owned or DOI contract vendor-owned and operated.

5. **PROCEDURES AND GUIDELINES.**

   A. UAS Project and COA Application:

   1. The AMD Alaska Regional Director, Harry Kieling is the DOI UAS Coordinator for FAA COA applications, harry_kieling@nbc.gov, 907-271-5626, 907-271-6569 (Fax).

   2. The alternate UAS Coordinator is Alaska Region Aviation Safety Compliance Specialist, Rod Russell, rod_russell@nbc.gov. 907-271- 5004, 907-271-4788 (Fax).

   3. Only a U.S. (Federal/State/Local) government agency or university may apply for a COA.

4. The COA includes, but is not limited to the operational plan, risk management, airworthiness, airspace, pilot qualifications, frequencies and communication plan, and should be developed and submitted using the COA online system (https://ioeaaa.faa.gov/oeaaaA/Welcome.isp). This web site is password protected.

5. Initial feasibility discussions will be conducted between bureau unit, local bureau and National Aviation Manager and, if necessary, DOI UAS Coordinator.

6. The local unit will prepare and submit a formal request to initiate a UAS COA. This proposal shall include the general purpose, objectives and justification for utilizing UAS.

7. The request shall be routed through the bureau state/regional office to the bureau National Aviation Manager for review and approval/disapproval.

8. If approved, the proposal will be forwarded to AMD and a request will be made for an on line COA account for the project.

9. Following the establishment of the on line COA account, the bureau proponent will complete the detailed COA application. When the proponent feels the application is ready for review and submittal, it should be forwarded through bureau channels to the Bureau National Aviation Manager for approval and then to the AMD COA coordinator for **committal** to the FAA.

10. Collaboration and agreement will occur prior to official commitment of the application. Status of the COA can be followed on the On Line web site. The COA, once issued, shall serve as the UAS Operations Plan.

B. Restricted/ /Prohibited and Warning Area Utilization:

1. Operations conducted entirely within Restricted/Prohibited and Warning areas do not require a COA; however, an MOU for UAS use will be established between the using bureau/AMD and the controlling agency and the request process outlined above is still necessary, requiring Bureau National Office approval.

C. Minimum Operational Requirements: The following requirements must be met prior to any operational use of UAS:

1. Obtain approval from bureau National Aviation Office

2. Obtain (1) a valid and current COA issued by the FAA or (2) MOU with the controlling agency for operations wholly within Restricted/Prohibited and Warning areas.

3. Exercise operating limitations in accordance with the COA/MOU Range provisions/COA and this OPM.

4. Meet DOI UAS Pilot/Mission Operator/Observer Training and Certification Requirements. DOI operators of UAS vehicles must first receive bureau authorization and concurrence and then must receive training in the specific vehicle to be operated. The using bureau and AMD will identify appropriate training. Personnel must possess training certificates from AMD or AMD-approved sources prior to receiving AMD certification.

5. Possess a DOI UAS Operator Letter of Authorization. The LOA must specify the UAS vehicle(s) that are authorized to operate.

6. VFR cloud clearances and visibilities for Class E airspace will be used regardless of airspace the UAS is operating in, except when operating in Class Airspace where 14 CFR Part 91.155 will apply.

7. Operations outside of restricted areas, warning areas, prohibited areas, and /or Class A airspace may only be conducted during daylight hours, unless authorized in the Special Provisions Section of the COA.

6. UAS Pilot Qualifications and Certification

A. General UAS Pilot Responsibilities: The pilot in command, (PIC) of a UAS is directly responsible for, and is the final authority as to the operation of that aircraft.

1. One PIC must be designated for all flights.
2. Pilots are responsible to perform a thorough preflight inspection of the UAS.
3. Pilots, Mission Operators and observers will not have concurrent responsibilities during the mission. They may not perform more than one crew duty at a time (i.e. Pilot/Mission Operator/Observer).
4. Per 350 DM 1.8, Reporting Requirements, an AMD 2 or AMD 23 will be required for each flight.

B. UAS Pilot Certification Factors: Rating requirements for the UAS PIC depend on the type of operation conducted and fall into two categories. The requirement for the PIC to hold a pilot certificate is based on various factors including:

1. Location of the planned operations.
2. Mission profile.
3. Size of the UA.
4. Whether or not the operation is conducted within or beyond visual line of sight. Each application will be carefully reviewed to assess the feasibility of allowing that type of operation.

C. Operations that require a FAA pilot certificate and Letter of Authorization:

1. All operations approved for use in Class A, B, C, D, and E airspace.
2. All operations conducted under IFR (FAA instrument rating required).
3. All operations approved for nighttime operations. Night operations are authorized in Restricted/Warning/Prohibited areas without a FAA pilot certificate unless prohibited by the Controlling Authority. Also the night operations without a FAA pilot certificate are permitted if specifically allowed in the Special Provisions Section of the COA.
4. All operations conducted at joint use or public airfields.
5. All operations conducted beyond line of sight.
6. Operations above 400 feet AGL or with visual line of sight conducted greater than one NM from the UAS observer. A FAA pilot certificate may not be required for altitudes to 1000 ft in Restricted/Warning/Prohibited areas if not prohibited by the Controlling Authority. Also, the higher altitude is authorized without a FAA pilot certificate if specifically allowed in the Special Provisions Section of the COA.
7. At any time the FAA (as specified in the COA) has determined the need based on the UAS' characteristics, mission profile, or other operational parameters.

8. For those operations that require a certificated pilot, the PIC, in order to exercise the privileges of his certificate, shall have flight reviews and maintain currency in manned aircraft per 14 CFR 61.56, *Flight Review* and 61.57, *Recent Flight Experience: Pilot in Command.*

9. For operations approved for night or IFR, the PIC shall maintain currency per 14 CFR 61.57, *Recent Flight Experience: Pilot in Command*, as applicable.

D. Operations requiring only a Letter of Authorization: The PIC *may not* be required to hold an FAA pilot certificate for the following operations:

1. Approved and conducted solely within visual line of sight.

2. In Class G or Restricted/Prohibited or Warning airspace.

3. Conducted in a sparsely populated location.

4. With visual line of sight conducted no further than 1 NM laterally from the UAS observer and at an altitude of no more than 400 feet above ground level (AGL) at all times. Altitudes to 1000 ft are authorized in Restricted/Warning/Prohibited areas unless prohibited by the Controlling Authority. Also, the higher altitude is authorized if specifically allowed in the Special Provisions Section of the COA.

5. Conducted during daylight hours only. Night operations are authorized in Restricted/Warning/Prohibited areas unless prohibited by the Controlling Authority. Also the night operations are authorized if specifically allowed in the Special Provisions Section of the COA.

6. Conducted no closer than 5 NM from any airport or heliport.

7. If the pilot in command (PIC) is not required to hold a FAA pilot certificate for such operations and stated in the approved COA he/she must have in lieu of a pilot certificate one of the following:

    a. Successfully completed an FAA private pilot ground instruction, and have passed the written examination, or

    b. Completed a tailored aviation course approved by DOI-AM covering applicable sections of the FAR/AIM or other aviation publications that will enable the pilot to safely operate a specific UAS in the class of airspace desired. This training will include but not be limited to weather (as applicable to a UAS pilot), emergency procedures, aircraft mishap reporting, SAFECOM Program, lost link, Air Traffic Control (ATC communications) and NOTAM procedures, classes of airspace, system operating limitation all other applicable DMs and OPMs pertaining to aviation.

E. UAS Specific Training and Certification for all UAS Pilots and Operators:

1. All UAS pilots/mission operators will complete the manufacturer's UAS specific training or equivalent, be tested on their knowledge, and be certified to operate the UAS upon graduation. These courses will be monitored by AMD Tech Services/Alaska Regional Director.

2. DOI-AM or approved Bureau inspectors will provide a Letter of Authorization (LOA) under the direction of the DOI-AM Chief of Tech Services/Alaska Regional Director. The LOA will specify the UAS vehicle(s) that are authorized to operate.

F. Flight Currency:

1. PIC must demonstrate three takeoffs (launch) and landings (recovery) in the specific UAS in the previous 90 days. If currency is lost prior to a mission, operator must regain currency by flying three emergency scenarios in the UAS simulator or fly under the observation of a current UAS pilot.

G. Medical Qualification: The PIC shall maintain, and have in their possession, at a minimum, a valid FAA Class 2 medical certificate issued under 14 CFR Part 67. For operations that are covered in paragraph 5G above, alternate medical certification that is as rigorous as the Class II, may be considered and approved on a case by case basis by the bureau National Aviation Manager and AMD. After approval this alternate certification must be listed on the COA.

H. General UAS Observer Responsibilities:

1. Observer duties include but are not limited to the following:

    a. Have a clear view of the area of operation.

    b. Be in communications with the PIC either within speaking distance or with a portable radio/cell phone.

    c. Keep the pilot advised of any possible hazards such as power lines, birds, other aircraft, rocks, and hazardous weather conditions.

    d. The observer can also act as the launch person for a hand launched aircraft.

2. Observer Training: Observers must have completed sufficient training to communicate to the pilot any instructions required to remain clear of conflicting traffic. This training, at a minimum, shall include knowledge of the rules and responsibilities described in 14 CFR 91.111, *Operating Near Other Aircraft;* 14 CFR 91.113, *Right-of-Way Rules: Except Water Operations;* and 14 CFR 91.155, *Basic VFR Weather Minimums;* knowledge of air traffic and radio communications, including the use of approved ATC/pilot phraseology; and knowledge of appropriate sections of the *Aeronautical Information Manual.* This training will be reviewed and approved by the Chief of Tech Services/Alaska Regional Director.

3. Observer Medical Qualification: The provisions of Paragraph 5J above will apply to observers.

I. Maintenance:

1. Maintenance inspectors will require the same qualifications (DOI/AMD 6700.202) as current AMD inspectors plus knowledge of UAS procedures. Until AMD can develop specific UAS maintenance inspection procedures, Mil Handbook 516, or similar document will be used. Initially Rod Russell, Alaska Regional Office, AMD, should be contacted to evaluate any specific UAS airworthiness questions.

2. A conditional Inspection must be performed during preflight and must be logged in the aircraft flight log for the first flight of each day as part of a continuing airworthiness compliance program. This entry should read "I have inspected this aircraft in accordance with (site the publication and reference) and have found it to be in condition for safe operation, and be signed and dated.

3. Log and maintain progressive flight hours of the aircraft in the aircraft logbook to validate inspection intervals, component times, and time life items i.e.; batteries.

4. Record malfunctions (loss of link), damage (parts that require repair to be airworthy again), and serial numbered parts that require replacement (wings, tail booms, etc). Record serial number of the part coming off and serial number of the part going on.

5. Every twenty four months, a biennial airworthiness inspection and carding by qualified maintenance personnel will be performed. At this time a new AMD 36 Aircraft Data Card will be attached to each aircraft within the system kit.

6. A maintenance inspector training and evaluation program will be developed for each system specific and in compliance with the POH.

7. AMD inspectors will coordinate with the FAA to ensure airworthiness criterion has been approved if required. AMD inspectors will then issue an AMD 36A/36B for UAS aircraft.

J. **Radio Frequencies:** Radio frequencies to be used will be coordinated with the Bureau's Radio Office and the FAA and be included in the COA application.

K. **Cooperator Aircraft:** This could include work with universities, other governmental agencies such as the Department of Defense, or multiple agency collaborative projects. Bureau involvement in these projects does not necessarily mean that the bureau has operational control; therefore it is important for field units to communicate with the bureau National Aviation Manager on all UAS projects to determine the extent of bureau responsibilities. UAS projects must have a COA (except those covered in paragraph 3c) and shall be obtained by the agency having operational control. Even if the COA is not requested by DOI (i.e. another government agency), it must be coordinated with Bureau aviation personnel and AMD COA administrator.

1. Involvement in a UAS project but no operational control: DOI personnel collect data but do not own, operate, or participate directly in the UAS process. This will be handled similar to an end product contract, field units need only to advise the bureau aviation manager and DOI COA Administrator. However, because of the nature of the responsibilities associated with the COA application and approval process, the individual/organization with Operational Control must file the COA.

2. DOI has operational control but does not own or operate the UAS: Bureaus would follow the procedures to include the formulation of a Project Aviation Safety Plan (PASP) identifying all agencies involved in the project, outlining their responsibilities and level of involvement. Each project will be evaluated on its own merits of involvement, complexity, and standards of safety. Therefore, responsibilities will be determined on a case by case basis as determined by the bureau National Aviation Manager and DOI-AM.

7. **EXCEPTIONS, LIMITATIONS.** Per 350 DM 1.9., Deviations from this OPM must be approved by the Associate Director, Aviation Management.

Mark L. Bathrick
Associate Director

1. **What is the purpose of the DOI Unmanned Aircraft System (UAS) Operational Test & Evaluation Pilot Program?**

   - **Explore UAS technology applications for improved DOI bureau mission performance, efficiency, cost, and safety. This will be accomplished by examining several different UAS platforms acquired on loan from DOD in real-world DOI mission applications to continue developing and defining DOI UAS requirements.**

2. **What are the potential benefits of the DOI UAS program?**

   - **Reduced long term cost (lower personnel, operating, training, equipment, procurement, & maintenance costs, potentially a 50%-75% reduction in burdened per flight hour cost for every hour a small UAS replaces the requirement for a manned aircraft).**
   - **Improved safety, reduced personnel injuries and fatalities (particularly in law enforcement).**
   - **Improved science/data quality to support policy and program decisions (UAS sensors permit recording, playback, alternative spectrum sensors).**

3. **What experience does DOI have with UAS's that will ensure this program is properly managed?**

   - **DOI's Aviation Management Directorate (AMD) has been working closely with DOD, the FAA, DOI bureaus, and others since 2006 to develop the policies and processes that form the underpinnings of DOI's UAS program. AMD's Associate Director has extensive experience in aircraft test and evaluation (Defense Acquisition Improvement Workforce Act – DAWIA Test and Evaluation Level III certified) and UAS operations (led a Navy flight test squadron that employed the largest UAS's in the Navy's inventory – QF-4, commanded a base that tested multi-service UAS's). DOI's U.S. Geological Survey (USGS) has had a dedicated UAS program office since 2007 to explore UAS platform and sensor technologies. DOI's current aircraft management and safety policies and procedures, in conjunction with current FAA UAS policy form the basis for the management and oversight of DOI UAS operations.**

4. **How has DOI acquire the UAS assets it has?**

   - **DOI leveraged its longstanding aviation partnership with DOD to acquire excess UAS assets via a no-cost, indefinite period loan (Figure 1).**

Figure 1 – Raven A Current DOI Dragon Eye UAS Inventory T-Hawk

Name / Description / Requesting Bureau	Systems / Airframes with DOI	Acquisition Method
Raven A **– 4.2lb battery powered single engine fixed wing. USGS.**	**19 systems, 3 aircraft per system, 57 total Raven A**	**On loan from U.S. Army. Expect DOI to be authorized ownership in FY 13. Transfer to Defense Logistics Agency Disposition Services (DLADS) for disposal upon program completion**
Dragon Eye **– 5.9lb battery powered dual engine fixed wing. BLM.**	**~~25~~ 0 systems, 3 aircraft per system, ~~75~~ 0 total Dragon Eye**	**Loaned from U.S. Marine Corps. Permanently transferred to NASA in Jul 2012**
T-Hawk **– 20lb gas powered single engine rotary wing. USGS.**	**22 systems, 2 aircraft per system, 44 total T-Hawk**	**On loan from U.S. Army, expect to transfer full ownership to DOI in FY 13 this year. Systems to be shipped to DLADS for disposal upon program completion.**

5. Why has DOI chosen to acquire the three different UAS models it currently has?

- **The Dragon Eye is an earlier generation, fixed wing small UAS with two battery powered engines and a relatively large visual signature, formerly operated by the USMC. The Raven A is a later generation single engine, battery powered fixed wing small UAS. Acquired from the Army, they have transitioned to the newer Raven B model. The Tarantula Hawk (T-Hawk) is a gas-powered rotary wing micro UAS. Procured by the Army and Navy, the Army subsequently decided to proceed in another direction, enabling DOI to obtain 22 never used T-Hawk systems from the Army. On April 15, 2011, a T-hawk UAS was used to conduct surveillance of the damaged Fukushima Dai-Ichi nuclear power station. This nuclear plant suffered severe damage as a result of a devastating earthquake and tsunami which struck the east coast of Japan one month earlier.**
- **The three UAS models acquired at no cost from DOD provide DOI with a diverse range of air vehicle and sensor package capabilities to assess against a varied spectrum of DOI**

natural resource missions. Two are low noise, battery powered small unmanned airplanes of varying visual signature, while one is a gas-powered helicopter-like vehicle.

6. **Why has DOI acquired so many UAS to support this pilot program?**

   - **A fundamental premise of DOI's small UAS test and evaluation pilot program is to keep the overall cost as low as possible. By acquiring these aircraft through no-cost loans from DOD, DOI eliminated all procurement costs. As these aircraft will be used in a test and evaluation program, it is expected that some aircraft will become unserviceable during testing. The number of no-cost units acquired from DOD will enable DOI to avoid potentially expensive repair costs associated with unserviceable units, simply replacing these with existing inventory as they become damaged through normal wear and tear.**

7. **What are the DOI UAS procurement costs and how are they being funded?**

   - **To date, all sUAS procured from DoD sources have been obtained at no cost. DoD even paid for the shipping.**

8. **What are the DOI UAS storage costs and how are they being funded?**

   - **Because the DOD UAS's on loan to DOI are small and packaged in easy to move, easy to store. They are currently stored in existing secure AMD-contracted aircraft hangar space and secure DOI storage facilities at virtually no cost. However, we anticipate the operator of the contracted hangar will require us to pay some fee for storage in FY 13. Those fees will be billed to the DOI Bureaus participating in this program.**

22 T-Hawk Micro-UAV Systems in Storage in the DOI Aircraft Hangar in Boise, ID

9. What are The UAS operations costs and how are they being funded?

- **The operations costs for the small UAS's currently on loan to DOI from DOD are extremely low. Two of the three UAS are powered by rechargeable dry cell batteries, while one operates using a small, two-cylinder gas engine. Personnel, transportation, and other costs associated with operating the UAS's on actual missions are covered by the bureaus whose operations the UAS's are supporting. These costs are comparable with (and many times less than) the costs associated with conducting these missions by traditional means.**

10. What are the projected DOI UAS repair costs and how are they being funded?

- **To keep the cost of its UAS operational test and evaluation pilot program as low as possible, DOI acquired enough UAS systems/aircraft from DOD to allow us to repair aircraft in house by cannibalizing parts from other unserviceable systems. Aside from the manhours required to make the repairs and maintain the inventory, our repair costs should be very low because we do not anticipate having to actually buy any parts.**

11. What are the DOI UAS training costs and how are they being funded?

- **DOI initially leveraged available DOD training to establish a core cadre of qualified DOI UAS operators. The only cost associated with this training was the travel costs for DOI personnel to attend. Subsequently, DOI's Aviation Management Directorate (AMD) Training Division has become approved to deliver UAS training directly to DOI personnel (for both the Raven A and T-Hawk variants). AMD has collaborated with local DOD units for necessary restricted airspace to conduct actual hands-on training at a cost of $_____ per class. To date, AMD has successfully conducted two Raven A training classes in Boise, qualifying an additional __ qualified DOI operators.**

12. What are the DOI UAS safety costs and how are they being funded?

- **No additional cost. As with DOI manned aircraft, mishap investigation costs are recovered through an interagency agreement with the respective bureau experiencing the mishap.**

13. What are the DOI UAS program management costs and how are they being funded?

- **Bureau costs funded by respective bureaus. AMD costs are recovered through activity based costing to respective bureau users. AMD funding/staffing sufficient to support projected bureau requirements through FY13.**

14. At what altitudes do DOI UAS fly? Are there any special airspace requirements?

- **DOI's UAS typically fly less than 400 feet above ground level. FAA regulations require DOI obtain an FAA certificate of authorization (COA) for all UAS operations outside restricted airspace. Our COAs specify that system operators must maintain visual contact with the UAS at all time. Additionally, in the event communication with the ground system is lost, our UASs have a "lost link" capability to return to the launch point without further external guidance. All DOI UAS operators have attended an FAA-approved ground training course and have been evaluated by DOI UAS Inspector Pilots.**

15. What kind of payload do these UAS carry?

- **DOI are equipped with electro optical video and infrared video cameras only. Tests are being conducted on low cost HD camera installations but these systems have not been fielded. DOI UAS cannot and do not carry weapons.**

Operational Test and Evaluation Proposal

Note: The template below is to be used in lieu of an Aviation Business Case Summary and Aviation Board of Directors action to document 1) a Bureau office requirement for UAS assets in FY 12 and 2) SES-level approval for the office to assume operational control of these assets during the requested period. Following receipt of an approved OT&E proposal, AMD and the Bureau office must execute a Memorandum of Agreement, which specifies each party's responsibilities, before assets will be shipped to the Bureau office.

From: Bureau Office

To: Mark Bathrick, Director, Aviation Management Directorate

Subject: Proposal to Conduct UAS Operational Test and Evaluation

1. Requesting Office: (Responsible Individual/Contact Information)

2. Is this a new requirement?

3. Assets Requested: (Raven-A or THawk, number of systems with associated ground support equipment. Each Raven-A system consists of three aircraft; each THawk has two aircraft)

4. Proposed Start and End Dates: (Date assets must be in place to support tests or spin-up training. To minimize inspector travel costs, assets are normally return shipped at the end of the season to one of three UAS Centers of Expertise (Boise, Denver, and Anchorage for inspection, component replacement.)

5. Proposed/Planned/Anticipated Tests to Be Conducted: Briefly summarize, one test per sub-paragraph, with approximate dates, location, agency to be supported, test objectives and number of hours to be flown.

Signature
Requesting official

1st Endorsement, Bureau National Aviation Manager

Concur/Non concur

Signature
National Aviation Manager

2nd Endorsement, Bureau Executive

Approved/Disapproved

Signature
Bureau

United States Department of the Interior

U. S. GEOLOGICAL SURVEY
Denver Federal Center
Denver, Colorado 80225

IN REPLY REFER TO:
MS 911

Memorandum

Date: February 17, 2012

To: Mark Bathrick, Associate Director, Department of the Interior, Aviation Management Directorate

From: Dr. Randall G. Updike, Regional Executive, U.S. Geological Survey (USGS) Rocky Mountain Area

Subject: Unmanned Aircraft System (UAS) Request

1. Requesting Office:
U.S. Geological Survey UAS Project Office
Michael E. Hutt
Denver Federal Center, Building 810
Denver CO 80225
(303) 202-4296
mehutt@usgs.gov

2. Is this a new requirement? No, the requirement for USGS UAS operations has been documented in the Department of the Interior (DOI) Unmanned Aircraft Systems Concept of Operations, USGS Budget Justification (Greenbook), USGS UAS Road Map and various Certificates of Authorizations (COA). The USGS Project Office has been operating Raven Systems since 2009 and was instrumental in acquiring both Ravens and T-Hawks for use across the DOI. We would plan on retaining the Raven systems we already have in house and require a transfer of T-Hawk systems from the cache of systems held by the Aviation Management Directorate (AMD) in Boise. We will initiate T-Hawk missions soon after the Aviation Management Directorate operator training scheduled for February 2012.

3. Assets Requested: Five AeroVironment Raven and Three Honeywell T-Hawk systems (including simulators, ground control stations and all associated peripherals).

4. Proposed Start and End Dates: 1 March, 2012-1 March, 2014
In order to support on-going missions, sensor and systems evaluations, it is requested that both Raven and T-Hawk systems be transferred to the USGS Project Office by 1 March 2012. The USGS UAS system requirements and continuation of the USGS role as the Center of Excellence for Scientific Applications will be reviewed yearly. Systems will be maintained and operated in accordance with applicable Federal Aviation Administration (FAA), AMD, and USGS rules, regulations and policies. The request is necessary to support specific projects as identified in Section 5 and as identified at- http://uas.usgs.gov/

5. Proposed/Planned/Anticipated Tests to be conducted: The USGS is dedicated to evaluating and supporting the development of UAS technology for the purpose of enhancing our earth observation methods and techniques in support of scientific research investigations, monitoring environmental conditions, analysis of climate change impacts and related land management decisions. As the identified COE of Scientific Applications, USGS will: support operational test and evaluations (OT&E) of UAS, maintain operator currency, conduct field operations,

perform analysis of remotely sensed data and identify needed sensor enhancements. USGS will analyze the capabilities of the DOI UAS systems and conduct operational tests to determine the optimum altitudes (given sensor capabilities and target attributes) and flight patterns to conduct various missions. The results of this OT&E will be applied during a relatively small number of operational missions nominated by field units. The results of these tests and early operations will be captured in case studies that will be disseminated among the DOI community for use in planning and executing subsequent operations. Below is a list of projects currently being planned or conducted by the USGS UAS Project Office:

Certificates of Authorization Approved:

- Sandhill Cranes Population Counts – Monte Vista National Wildlife Refuge, Colorado. (USF&WS, USGS) – March and Oct. 2012 (third mission at this location). Estimated Raven mission time: 48 hours. The objective of the operation is to determine if the Raven's sensor package is capable of picking up the cranes thermal signatures and if the data collected can be utilized to efficiently and comprehensively provide a means of crane population estimates during periods of night roosting.

- Assessment of Contaminated Groundwater Seeps – EPA Superfund Site, New Castle, Delaware. (EPA, USGS) – April 2012. Estimated Raven mission time: 24 hours. Major releases of chlorinated benzenes are known to have occurred at the Standard Chlorine of Delaware Inc. EPA Superfund Site from 1966-2002, resulting in contamination of the groundwater underlying the site and the wetlands surrounding Red Lion Creek. Wetland and sediment areas impacted by contaminated groundwater discharge and past surficial spills remain outside this containment area. Consideration of expanding COA to include T-Hawk.

- Monitoring River Impacts during Removal of Elwha & Glines Dams – Washington. (BoR, NPS, USGS) – June & September 2012. Estimated Raven (multiple missions) time: 48 hours. The primary monitoring and research objective for the Elwha River Restoration Project is to produce a scientifically sound technical narrative describing what happened to the fish, reservoir sediment, and the reservoir topography and vegetation during and following dam removal. Many of those uncertainties can be answered by using aerial over flights, including those from unmanned aircraft systems, to monitor changes in the reservoirs and river channel. Consideration of expanding COA to include T-Hawk.

Certificates of Authorization In Progress:

- Assessment of Park Boundary Fences and Detection of Invasive Plants and Feral Animals – Haleakala National Park, Hawaii. (NPS) – May, 2012. Estimated Raven mission time: 24 hours. The Haleakala Resource Management Division is responsible for the preservation, maintenance and restoration of the Park's natural, cultural and historic resources covering over 50 miles of fence to exclude pigs, axis deer, predator mammals, and invertebrate threats to the resources, alien plant control, native plant restoration, monitoring of endangered species, and air quality. Aerial surveillance and reconnaissance would yield greater detection results by allowing biologists to view high definition video of low altitude surveys to better scrutinize the detail of the visual findings.

- Locating and Population Counts of Sage-Grouse Leks – Middle Park, Colorado. (USF&WS, CPW, USGS) – May, 2012. Estimated Raven mission time: 36 hours. To best manage this species of concern (greater sage-grouse) accurate numbers of birds displaying at leks are needed. Without this information population declines can go undetected. Through the use of the Raven A UAS technology, an accurate population estimate can be obtained. This will be possible as the Raven A can be quickly and easily launched and the area surveyed for active lek sites. Imagery collected over active leks will be analyzed to determine the number of grouse present. This information will provide CPW Conservation Biologists data for their use in overall population management of this species of concern.

- Missouri River Erosion Study – South Dakota. (BIA-LBST) – Summer 2012 (second mission at this location). Estimated Raven mission time: 24 hours. The study area's topography is undulating; vegetation generally is prairie grasses with small areas of trees. Due to the lack of roads, crumbling river banks and shallow water unsuitable for motorboat traffic, this area is not easily accessible for much of the shoreline. The Unmanned Aircraft System (UAS) Raven technology will be invaluable as an environmental tool to monitor bank erosion and changing habitat conditions. Raven flights will be used as a reconnaissance and surveillance tool to capture video and still pictures, providing a baseline reference of conditions and recording physical changes that occur along this small portion of the Missouri River during the 2-year study. Consideration of expanding COA to include T-Hawk.

- Surface Mine Surveys – West Virginia. (OSM) – Fall 2012 (second mission at this location). Estimated Raven (multiple mission) time: 48 hours. There are approximately 1800 coal mines in West Virginia. All coal mines are required to have installed drainage control structures internally and around the perimeter of each mine area to control runoff from the disturbed area and to prevent flooding. Currently, State and Federal inspectors are spending a vast amount of time inspecting these structures. Due to the rough terrain there is also the potential for added maintenance to their vehicles. Additionally there are hundreds of underground mine fires throughout the state where very little information is known, the hardest of which is the extent of the fire. This area is ideal to test the applications of the Raven UAS in Coal mining inspection and oversight. Consideration of expanding COA to include T-Hawk.

- Pygmy Rabbit Landscape Habitats – Idaho (BLM, Boise State University) Fall 2012 (second mission at this location). Estimated Raven mission time: 16 hours. The UAS approaches will help develop map data for cover, food and thermal landscapes for pygmy rabbits and eventually will be linked to the fitness of pygmy rabbits. The data generated will aid in land use decisions made by agencies for habitat conservation. The projects mission is to evaluate the quality of cover (e.g., concealment and transparency), diet (e.g., nutrients and chemical defenses), and temperatures across the landscape in support of wildlife habitat studies. Consideration of expanding COA to include T-Hawk.

- Abandoned Solid Waste Removal & Preservation - Mojave National Preserve, California (NPS) November 2012. Estimated Raven mission time: 48 hours. Due to lack of adequate resources to survey 60,000 acres, accomplishing clean-up efforts in the Mojave National preserves are particularly difficult. Aerial photos with approximately one-foot resolution are necessary to enable us to remotely survey Lanfair Valley for abandoned material. UAS technology would help park staff resource managers search the photographs to identify these sites. Additional important information could be gleaned as well, including the ability to locate all fences (removal of non-contributing fences is another goal, again expanding recreational opportunities) and possibly locate invasive exotic plant infestations enabling their treatment and eradication. Consideration of expanding COA to include T-Hawk.

- San Simon Watershed Project - Southeastern Arizona on BLM administered land. May, 2012. Estimated Raven mission time: 30-40 hours. The goal of this mission is to support the local Field Office Manager in conducting natural resource inventories and interface with the Gila District Law Enforcement program. Resource flights will include wildlife surveys, livestock grazing pattern mapping and vegetation mapping to assist with land management decisions. Support will also be available to law enforcement in connection with drug and border related illegal activities as it relates to resource damage assessments. COA is currently in development.

- Diamond Complex Project - Powder River Basin in Southeastern Montana (BLM). July 2012 – June 2013. Estimated Raven mission time: 10-20 hours. The goal of this mission is to conduct post wildfire monitoring of coal seams. Actively burning coal seams are a potential source of ignition for wildland fires, pollution, sedimentation, and are a hazard to humans, livestock, and wildlife. Historically, there have been 16 coal seam fires known to have been ignited by wildfire in the Powder River Basin. A draft

COA is currently in development.

- Owyhee Uplands AIM Project. The Tri-State area of Idaho, Oregon and Nevada (BLM). August 2012 – August 2013. Estimated Raven mission time: 20-40 hours. As part of the Assessment, Inventory and Monitoring (AIM) program in the BLM, UAS technology has been identified in proving support to this project. 6 new wilderness areas have been identified in the Owyee uplands. This project will assist the AIM team in developing additional monitoring tools to quantify vegetation habitat.

- National Wildfire Support- Rocky Mountain Area or the Eastern Great Basin GACC (BLM). May 2012 – May 2014. Estimated Raven mission time: 20-40 hours per year. Anticipate working with one GACC in providing wildfire IR intelligence to the fire program. Initial plans are to be available in these large geographic areas in support of prescribed and initial attack wildland fire activities. These flights would be coordinated with local-DOI unit aviation managers.

- Coal Seam Fire Detection and Monitoring – Garfield County, Colorado (OSM) Fall 2012. Estimated Raven mission time: 24 hours of data collection. The goal of this project is to determine if the Raven-A and/or T-Hawk can support the State of Colorado, Inactive Mines Reclamation (CIMR) Program to inventory and monitor three active coal seam fires. For this proof-of-concept project, CIMR would like to focus on three mine sites located in Garfield County, Colorado. The three sites are the Pocahontas, South Canyon and Sunshine coal seam fire sites.

Certificates of Authorization Proposed:

- Badlands National Park, South Dakota (NPS) – Fall 2012. Proof-of-Concept for search and rescue applications, natural resource management, and regular park inspection. Estimated Raven mission time: 40 hours.

- Hawaii Volcano National Park – Kilauea, Hawaii (NPS, USGS). Utilization of small UAS for gas emission. Pending development of chemical sensing capabilities – DARPA and Johns Hopkins University. Estimated mission time: 40 hours of data collection per system

- Joint Fire Science Proposal Eglin Air Force Base Fire – Eglin AFB, Florida (AF, USFS, USGS) Fall-Winter 2012-13. The JFSP will continue its scientific research into innovative tools and applications for support of fire science in concert with structural and prescribed wildland fire on the AFB. Estimated mission time 16 hours per system.

- Chincoteague NWR Complex - Virginia (USF&WS, NASA) Fall 2012. A research initiative for the use of small UAS for monitoring of the National Wildlife Reserve in conjunction with the NASA Wallops Research Flight Facility. Estimated mission time (demonstration): 16 hours per system

- Carlsbad Caverns National Park – Carlsbad, New Mexico – Winter 2012-13. Proof-of-Concept for wildfire post assessment and identification of archeological surface features such as earth ovens, mescal pits, and most heaths, wall alignments, corrals, old roads and trails, wickiup and tipi rings. The aerial imagery would also be used to meet NMSHPO Archeological Records Management System (ARMS) requirements for recording sites. In addition, the aerial data would provide visual imagery in conducting National Historic Preservation Act Section 106 Consultations between the park and the 14 Traditionally Associated Tribes and Pueblos. Estimated Mission time: 24 hours of T-Hawk mission time

- Palmya Atoll – Northern Pacific Ocean. Proof-of-Concept operation utilizing UAS to inspect island infrastructure, detect and monitor feral cats. Estimated Raven Mission Time: 40 hours

- Dinosaur Tracks (BLM) – SE Colorado. Stereo graphic data collection of archaeological sensitive sites for close range photogrammetry of dinosaur tracks. Estimated T-Hawk Mission Time: 40 Hours

- Mountain Pine Beetle (MPB) Pine Tree Mortality – Grand County, Colorado. Monitoring and mapping of the extent of tree mortality throughout the mountain west provides valuable data for forest managers. Also, testing and verification/validation of simultaneous satellite collection of lodgepole pine tree mortality caused by infestation of the MPB provides ground truth that can be scaled to provide strategic overviews of the wide area extent. Estimated 24 hours of mission time (both systems)

Serve as a cache to back-up for USGS Missions:

In addition to being the primary source for the projects described above, the USGS UAS Project Office would serve as the principle back-up for other USGS missions including:

Vegetative Monitoring, Riparian Restoration Assessments, and Cold Water Refugia Surveys on the Big Hole River: The Raven-A will be used to perform vegetative monitoring, assess the success of numerous restoration projects that have been undertaken by Montana Fish Wildlife and Parks, the Bureau of Land Management, and various private enterprises, and identify cold water refugia locations along the Big Hole River in Montana. Dates for these flights for this season will be from May 2012-October 2012 with repeat flights planned for the following season. This work will support the BLM and the USGS who are working in collaboration with various state and private entities. Total number of flight hours is projected to be between 30-40 hours.

Grizzly Bear Monitoring in the Taylor Fork Watershed: The Interagency Grizzly Bear Study Team is planning on using a Raven-A to monitor Grizzly Bear populations during the summer months in their alpine habitats within the Taylors Fork watershed, Montana. Dates for these flights would likely be in late summer to fall (July-October) depending on the timing and nature of the alpine habitat usage. DOI supported agencies include the USGS, BLM, NPS, FWS, as well as the USDA NFS and local and state entities. Total number of flight hours is projected to be between 30-40 hours.

Elk counts in Paradise Valley: Although still in the planning stages, there is discussion of using the Raven-A to count elk populations in the Paradise Valley, MT. Dates for these flights would likely be in the late summer to fall (July-November). DOI supported agencies include the USGS, BLM, NPS, FWS as well as the USDA NFS. Total flight hours are projected to be between 20-40 hours.

Your consideration of this request is greatly appreciated.

Randall G. Updike
U.S. Geological Survey
Regional Executive, Rocky Mountain Area

David A. Johncox
U.S. Geological Survey
National Aviation Manager

United States Department of the Interior

U. S. GEOLOGICAL SURVEY
Denver Federal Center
Denver, Colorado 80225

IN REPLY REFER TO:
MS 911

February 13, 2012

Memorandum

To: Mark Bathrick, Associate Director, Department of the Interior, Aviation Management Directorate

From: Randall G. Updike, Regional Executive, U.S. Geological Survey Rocky Mountain Area

Subject: Unmanned Aircraft System (UAS) Request

1. Requesting Office: (Responsible Individual/Contact Information)
   Robert H. Diehl
   Research Ecologist
   Northern Rocky Mountain Science Center (NOROCK)
   2327 University Way, Suite 2
   Bozeman, Montana 59715
   406-994-6556
   rhdiehl@usgs.gov

2. Is this a new requirement? No, requesting to have Raven-A Kit #10 returned to the Northern Rocky Mountain Science Center.

3. Assets Requested: One Raven-A system (Kit#10)

4. Proposed Start and End Dates: 2/10/2012 - 1/31/2013

5. Proposed/Planned/Anticipated Tests to Be Conducted:

Pilot Currency-Simulator: We currently have three trained Raven pilots who require a Raven-A system to maintain currency through the simulator. Dates are as soon as possible until our flight training COA, draft #2809, is approved (see below). Simulator currency flights will be conducted at NOROCK to support the USGS UAS Project Office, with the objective of maintaining pilot currency so that we can assist and conduct planned and future Department of the Interior (DOI) missions. Total number of flight hours will depend on the time required for COA #2809 to be approved, but will require a minimum of 12 hours.

Pilot Currency-Flight Operations: We currently have three trained Raven pilots who require a Raven-A system to maintain currency through flight operations. Dates of currency flights will begin when COA #2809 is approved and continue at approximately 90 day intervals. Currency flights will be conducted near Pipestone, Montana, to support the USGS UAS Project Office, with the objective of maintaining pilot currency so that we can assist and conduct planned and future Department of the Interior (DOI) missions. Total number of flight hours for the season will depend on the time required for COA #2809 to be approved, but will require a minimum of 36 hours.

Vegetative Monitoring, Riparian Restoration Assessments, and Cold Water Refugia Surveys on the Big Hole River: The Raven-A will be used to perform vegetative monitoring, assess the success of numerous restoration projects that have been undertaken by Montana Fish Wildlife and Parks, the Bureau of Land Management, and various private enterprises, and identify cold water refugia locations along the Big Hole River in Montana. Dates for these flights for this season will be from May 2012 through October 2012 with repeat flights planned for the following season. This work will support the Bureau Land Management (BLM) and the USGS who are working in collaboration with various state and private entities. Total number of flight hours is projected to be between 30-40 hours.

Grizzly Bear Monitoring in the Taylor Fork Watershed: The Interagency Grizzly Bear Study Team is planning on using a Raven-A to monitor Grizzly Bear populations during the summer months in their alpine habitats within the Taylors Fork watershed, Montana. Dates for these flights would likely be in late summer to fall (July - October) depending on the timing and nature of the alpine habitat usage. DOI supported agencies include the USGS, BLM, National Park Service (NPS), Fish and Wildlife Service (FWS), as well as the U.S. Forest Service and local and state entities. Total number of flight hours is projected to be between 30 - 40 hours.

Elk counts in Paradise Valley: Although still in the planning stages, there is discussion of using the Raven-A to count elk populations in the Paradise Valley, Montana. Dates for these flights would likely be in the late summer to fall (July-November). DOI supported agencies include the USGS, BLM, NPS, FWS as well as the USFS. Total flight hours are projected to be between 20-40 hours.

Randall G. Updike
U.S. Geological Survey
Regional Executive, Rocky Mountain Area

David A. Johncox
U.S. Geological Survey
National Aviation Manager

United States Department of the Interior
Bureau of Land Management
Office of Law Enforcement and Security
1849 C Street, NW
Washington, DC 20240

Operational Test and Evaluation Proposal

From: Sal Lauro, OLES

To: Mark Bathrick, Director, Aviation Management Directorate

Subject: Continuation of UAS Operational Test and Evaluation

Requesting Office: OLES – Region 1 (CA)
POC: Special Agent in Charge Laurel Pistel (tel: 916-978-4457)
[Note: sUAS will continue to be tested out of Ukiah, CA by SA Matt Knudson and SA Lance Maniscalco]

Is this a new requirement? No

Assets Requested: One Raven-A system

Proposed Start and End Dates: Until June 15, 2012 (date COA expires)

Proposed/Planned/Anticipated Tests to Be Conducted:
Continued system testing in COA area with a goal of determining if this is a tool we are interested in continuing to invest time and resources. We will test a variety of scenarios to test capabilities and utility. Specific missions TBD and will likely be in concert with an actual law enforcement scenario.

Bureau National Aviation Manager
John Gould

Concur/Non Concur

Signature

Idaho Native Plant Study Project Aviation Safety Plan

Mission: Aerial Photography	Project Name: Idaho Native Plant Study	Unit: BLM Idaho
Anticipated Project Date: August 1 - 2, 2012	Start Time: Sunrise, 0630	Ending Time: Sunset, 2102
Project Plan Prepared by: /s/ *Steve Banks*	Title: State Aviation Manager	Date: 7/25/2012
Note: Signature by the preparer verifies that all personnel have the required training for the mission. Attach Map, clearly showing areas to be flown; aerial hazards must be indicated.		
Project Plan Reviewed by: /s/ *Greg Loper*	Title: Twin Falls District UAM	Date:
Project Plan Reviewed by: /s/ *Rusty Warbis*	Title: BLM NAO UAS Program Spec.	Date:
Project Plan Reviewed by:	Title:	Date:
This Flight is Approved by: /s/ Peter Ditton	**Title: Associate State Director**	**Date:**

Project Description: Photograph native plant research plots from an altitude of 400 feet AGL or below. The project site was burned in the Kinyon road fire in mid-July. The terrain is flat and rolling. The project site is within the Saylor Creek R-3202 restricted area controlled by Mountain Home Air Force 366th Wing.

Attachments: X Map X Other: Google Earth Photos – project plot, driving instructions

Project Aviation Manager: Brad Koeckeritz, AMD	Phone: 208-433-5091	Cell: 208-508-7382
PIC: Brad Koekeritz, AMD	Phone: 208-433-5091	Cell: 208-585 7382
PIC: Steven Guthomson, AMD		
Mission Observer: Don Major, BLM Idaho	Phone: 208 373 4049	Cell: NA
Mountain Home Airspace Scheduling Office	Phone: 208 828 4607	
Mobile Range Unit – Cowboy Control Operations	Phone: 208 828 1379	
BLM Idaho State Aviation Manager	Phone: 208 373 3853	Cell 208 631 1624
BLM Twin Falls Unit Aviation Manager	Phone: 208 735 6501	Cell 208 308 3987
Nancy Shaw, USFS Rocky Mountain Research Station	Phone: 208 373 4360	

Nature or Mission: Aerial Photography	sUAS system to be used: Honeywell RQ-16C T-Hawk	Accounting Code: NA
Projected Cost: $ 1000		

sUAS Kit# 1468/1502	Make & Model: RQ-16C T-Hawk		
Pilot Name(s): Brad Koeckeritz, AMD, Mike Guthomson		Pilot(s) Carded: ☒Yes ☐No	A/C Carded: ☒Yes ☐No
Flight Following Procedure: Flight following will be conducted using the Honeywell software and the ground control unit for the T-Hawk system			
FM Receive: 166.8500	FM Transmit: 163.025	Tones: 114.8	
AM Air to Air: 132.575	AM Cowboy Control: 134.1	Other: Mountain Home Approach – 124.8	

Start Location	Latitude	Longitude	Elevation	Description of Launch/Recovery Areas
R-3202, Research Plot	42.6631666	-115.469368	4000’	Launching and recovering from burned rangeland

Type of Flight	Personnel Protective Equipment Requirements
☐ Raven	Eye protection will be used during run-up and launch. Ear protection will be worn within 200’ of a running T-hawk. Eye protection will be worn during fueling operations. A fire extinguisher will be available during fueling.
☒ T-Hawk	
☐Both	
☐Other:	

Military Training Route (MTR) Information: N/A

MTR	Route Legs-Altitude	Activity	Time		Time Zone
☐		☐Hot ☐Cold	Start	Stop	☐UTC☐Local
☐		☐Hot ☐Cold	Start	Stop	☐UTC☐Local
☐		☐Hot ☐Cold	Start	Stop	☐UTC☐Local

Other airspace concerns/hazards: All flights will be conducted within Restricted Area R-3202 at or below 500' AGL. Mountain Home Airspace Office contact: 208 828 4607. Steve Banks scheduled directly (done on 7-26) with Mountain Home Airspace Scheduler Wednesday, August 1 and Thursday, August 2, 0600 to 0900. This is the only time slot open on these two days. There will be no military flight activity within R-3202 during the 0600 to 0900 period.

Justification Statement for sUAS flights: These flights are required in order to photograph native plant research plots that were burned in a recent wildfire. The timeframe for obtaining useful photographic information is limited by environmental conditions obscuring the plots with blowing dirt, rainfall and loss of ash that delineates the burned areas. This is the rationale for a rapid response

Special Instructions: Personnel should be prepared for field conditions and should take precautions for any possible inclement weather – hot, windy, no shade. Temperatures could range from 75 to 100 degrees.
BLM Idaho will provide a 4 x4 pick-up truck and 1000 watt gas powered generator

Emergency medical attention and evacuation plan: Any medical evacuation will be coordinated through South Idaho Dispatch via radio (Davis Repeater – receive: 166.8500, transmit 163.0250 tone 114.8) or by calling 208-886 2373. In the event of a medial incident the incident commander will be Brad Koeckeritz.

Logistics: The project crew (Don Major + others) will meet Brad Koeckeritz at the hangar at 4180 S. Orchard to load the UAS and associated equipment, at 0400. The project site is approximately a 2 hour drive from Boise – I-84 to Mountain Home, highway 51 to Bruneau, take a left on the Bruneau Valley road (east side of the valley), proceed to Winter Camp road, turn left onto Winter Camp road go 4.9 miles, turn north on Pothole road go 3.8 miles, turn left on 2 track road and proceed approximately 2.8 miles to a 2 track road that goes south 1 mile to the plots. Total miles from Boise = 99

Or – I-84 to Hammett, cross Snake River on Hwy 78, 6.3 miles from I-84 to pothole road
27 miles to Pothole to project access road (total miles from Boise = 99

Don Major will install reference panels for geo- rectifying photos. Don will provide Brad with the coordinates for each plot and transects, so that the UAS can have the flight profile pre-loaded into the flight controller. A 100 watt generator is required for powering the controller.

Handheld Radio: Don Major will have a BLM Idaho radio with the South Idaho repeater frequencies

Risk Assessment Matrix				
	Severity			
Likelihood	IV Negligible	III Marginal	II Critical	I Catastrophic
Frequent A	2	3	4	4
Probable B	2	3	4	HIGH
Occasional C	1	2	SERIOUS	4
Remote D	1	MEDIUM	2	3
Improbable E	LOW	2	2	2

Reference the Aviation Risk Mgmt. Workbook, JHAs, etc., to assist completion of Risk Assessment

Assess the risks involved with the proposed operation. Use additional sheets if necessary.			
	Pre-Mitigation hazards rate out as:		
	Likelihood A-E	Severity I-IV	Risk Level
1. Mid-air collision with another aircraft	E	I	2
2. Collision with personnel	C	II	3
3. Collision with vehicles	B	II	4
4. Operating A/C outside of approved area	D	III	2
5. Operating aircraft outside of manual limitations	B	III	3
6. Collision with birds	D	IV	1
7. Fire During Fueling	D	III	2
8. Heat Injury	C	II	3
9. Cold Injury	E	II	2
10. Loss of Link with aircraft. (LOL)	C	II	3
11. Injury to fingers/hands due to spinning blades on aircraft	C	II	3
12. Air Vehicle loss of control.	C	II	3
Pre-Mitigation Overall Rating:			2.6 Med-high

Mitigation Controls:	Post Mitigation hazards rate out as:		
	Likelihood A-E	Severity I-IV	Risk Level
1. Operations within approved area in coordination with Saylor Creek R-3202 Range Control. The project will be conducted during time periods scheduled which precludes any other aircraft to operate during the scheduled time period.	E	I	2
2. Flight patterns will be planned so to avoid people on the ground when approaching for landings. Non-participating personnel will remain clear of the ground control station so as not to be a distraction to the operators. Landing areas will be established that minimize risk of impact to people. The project area is remote and public visitation is rare	D	II	2
3. Vehicles will be parked outside of operating areas.	D	IV	1
4. A/C will be programmed to stay within the operating areas in the event of LOL. Boundaries will be placed into Falconview and will be monitored at all times while the aircraft is in the air.	D	IV	1
5. Operations outside of manual limitations will be approved by the AMD training division chief with concurrence of the OIC and RSO.	C	IV	1
6. If a bird is encountered and attempting to come in contact with the airplane then the pilot shall land as soon as practical in order to prevent injury to the	E	IV	1

animal.			
7. The project area is burned and is fire safe for 5 miles all around the project area. South Idaho Dispatch will be immediately notified of any fire. A fire extinguisher will be on site and available at all times. Fueling will be done in an area clear of any flammable materials.	E	I	1
8. Personnel will bring enough water to stay hydrated.	D	II	2
9. Personnel have been briefed on the possible weather conditions and advised to bring proper clothing and equipment. Anyone showing signs of hyperthermia will be placed in shade and provided water. If condition deteriorates South Idaho Dispatch will be contacted for further assistance.	D	II	2
10. Prior to launching any aircraft the LOL settings will be verified. LOL setting will be to have the aircraft return to its point of launch and AUTOLAND. If LOL happens for more than 3 minutes range control will be notified with the last know location and heading of the UAV.	C	IV	1
11. Checklist procedures will be followed to ensure that personnel ensure that their hands stay clear of rotating blades.	D	II	2
12. T-hawks will not be flown overhead of any people, structures or vehicles, and will only come within 100' of the operator's for purposes of takeoff and landing. Flights at 20MPH should be avoided based on feedback received from Honeywell.	C	IV	1
Post-Mitigation Overall Rating:			1.4 med-low
Success Probability/Benefits Statement: Success of the project will be measured by meeting the project objectives of photographing all of the research plots and the quality of the photographs allows for geo- rectifying the photos. A high probability of success is expected. Overall risk will be reduced to an acceptable level by the use of various controls. Substantial coordination with Mountain Home Air Force Airspace Office has been completed to ensure separation of other air traffic. The remoteness of the site and the design of the flight patterns will minimize the chance that personnel will be struck by the air vehicle. In the event of any mishap the AMD-TD chief and the AMD Safety Chief and BLM Idaho Safety will be notified.			

Appropriate Management Level for Risk Decisions		
Risk Level	Project	Incident
HIGH	AMD Associate Director/ State Director	Incident Commander or Ops Chief
SERIOUS	AMD Division Chief/ District Manager	Incident Commander or Ops Chief
MEDIUM	Project Aviation Manager	Air Operations
LOW	sUAS Pilot In Command	Air Operations

Mission Planning/Preflight Briefing Checklist: Review with all participants as part of preflight briefing

1. Chain of command, individual roles and responsibilities are identified to all participants?	☐ Yes	☐ No	☐ NA
2. Project Aviation Safety Plan is approved and signed at the appropriate levels?	☐ Yes	☐ No	☐ NA
3. Is the emergency evacuation plan reviewed?	☐ Yes	☐ No	☐ NA
4. Are all elements in place to track the sUAV at all times?	☐ Yes	☐ No	☐ NA
5. Can terrain, altitude, temperature or weather that could have an adverse effect be mitigated?	☐ Yes	☐ No	☐ NA
6. Are all aerial hazards identified and known to all participants?	☐ Yes	☐ No	☐ NA
7. Have ground operations hazards and safety been identified to all participants?	☐ Yes	☐ No	☐ NA
8. Have mitigating measures been taken to avoid conflicts with military or civilian aircraft?	☐ Yes	☐ No	☐ NA
9. Have adequate landing areas been identified and or improved to minimum standards?	☐ Yes	☐ No	☐ NA
10. Are all agency personnel qualified for the mission?	☐ Yes	☐ No	☐ NA
11. Are there enough (qualified) agency personnel to accomplish the mission safely?	☐ Yes	☐ No	☐ NA
12. Is the pilot carded and experienced for the mission to be conducted?	☐ Yes	☐ No	☐ NA
13. Will adequate briefings be conducted prior to flight with all participants?	☐ Yes	☐ No	☐ NA
14. Is the aircraft capable of performing the mission with a margin of safety?	☐ Yes	☐ No	☐ NA
15. Does the aircraft have the capability to perform the mission based on predicted weather conditions?	☐ Yes	☐ No	☐ NA
16. Is the aircraft properly carded?	☐ Yes	☐ No	☐ NA
17. Do all personnel have the required PPE?	☐ Yes	☐ No	☐ NA
18. Remember; maps of areas/sites, handheld radios, cell phones.	☐ Yes	☐ No	☐ NA
19. Are pilot flight and duty times compromised?	☐ Yes	☐ No	☐ NA
20. Is there an alternative method that would accomplish the mission more safely?	☐ Yes	☐ No	☐ NA
21. Have the proper approvals been given by FAA?	☐ Yes	☐ No	☐ NA
22. If flying in Restricted Airspace, has notification been made with controlling authority prior to launching sUAS?	☐ Yes	☐ No	☐ NA
23. Other? (identify) Fire Extinguisher	☐ Yes	☐ No	☐ NA
24. Other? (identify)	☐ Yes	☐ No	☐ NA
25. Other? (identify)	☐ Yes	☐ No	☐ NA

Identify Corrections (if any):

PIC Signature:		**Date:**	**Operator/Observe Signature:**		**Date:**

Project Aviation Safety Briefing

Briefing Leader: _____

Briefing Date: _____ Time: _____ Location: _____

Discussion Items:

__ a. Hazard Analysis (as outlined in plan)

__ b. Safety Air Ops (Ground)

__ c. Safety Air Ops (Flight)

__ d. Military Training Routes

__ e. Flight Following

__ f. Frequencies

__ g. Lost Link Procedures

__ h. Emergency Evacuation Plan

__ i. Authorities

__ j. Weather Considerations

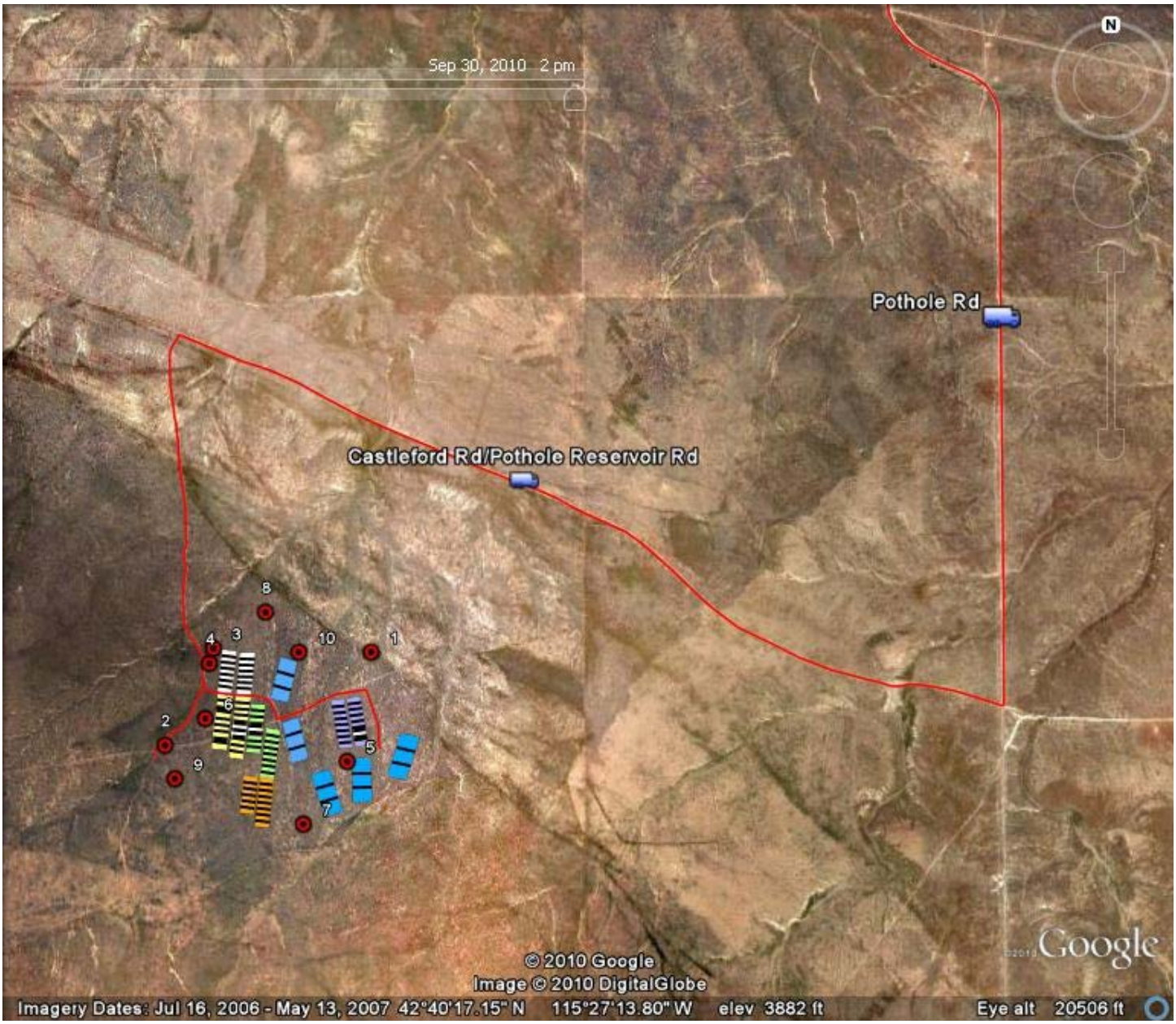
__ k. Review applicable JHAs/Risk Assessments

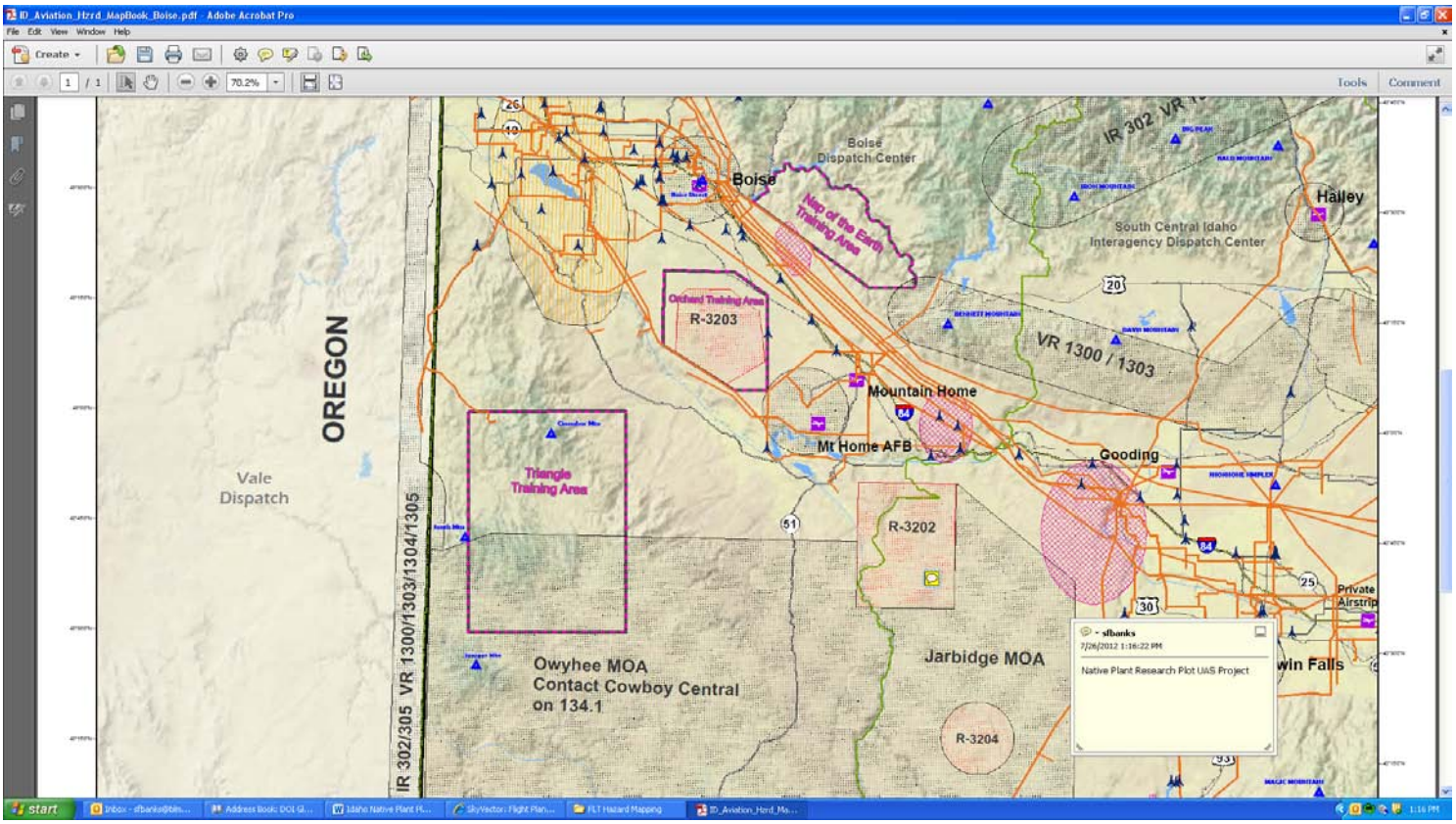
__ l. other Click here to enter text.

Briefing Attendees Signature and Concurrence:	


Jul 20, 2010 4 pm
Jul 2010
Sep 2010
N
© 2010 Google
Image © 2010 DigitalGlobe
Google
Imagery Date: May 13, 2007
42°39'43.97" N 115°28'19.62" W elev 3946 ft
Eye alt 8256 ft


Jul 20, 2010 4 pm
Hammett
Glenns Ferry
turn-off from Highway 78
Hwy 51/78 T
Browns Creek Rd/Pothole Rd
Pothole Rd
Castleford Rd/Pothole Reservoir Rd
Image © 2010 DigitalGlobe
© 2010 Google
Google
Imagery Dates: Mar 10, 2005 - Nov 1, 2006 42°48'21.71" N 115°29'15.22" W elev 3030 ft
Eye alt 33.03 mi


Sep 30, 2010 2 pm
N
Pothole Rd
Castleford Rd/Pothole Reservoir Rd
8
4
3
10
1
6
2
5
9
7
© 2010 Google
Image © 2010 DigitalGlobe
Google
Imagery Dates: Jul 16, 2006 - May 13, 2007 42°40'17.15" N 115°27'13.80" W elev 3882 ft
Eye alt 20506 ft


ID_Aviation_Hzrd_MapBook_Boise.pdf - Adobe Acrobat Pro
Boise
Dispatch Center
Boise
Hailey
South Central Idaho
Interagency Dispatch Center
Map of the Earth
Training Area
Orchard Training Area
R-3203
VR 1300 / 1303
Mountain Home
Mt Home AFB
Gooding
OREGON
Vale
Dispatch
Triangle
Training Area
R-3202
IR 302/305 VR 1300/1303/1304/1305
Owyhee MOA
Contact Cowboy Central
on 134.1
Jarbidge MOA
R-3204
Private
Airstrip
sfbanks
7/26/2012 1:16:22 PM
Native Plant Research Plot UAS Project
start

From:	Getchell, Ralph
To:	Sweeney, Cynthia D
Cc:	Laraway, Leslie; Keith C. Raley; Wees, Jennifer L; Mills, John
Subject:	Fwd: FOIA Request
Date:	Tuesday, December 04, 2012 3:53:59 PM

Cynthia

Here is the info from the three incidents I discussed with you. I think your requester can take this info plus the hours I provided to come up with a mishap rate in whatever unit of measure that they choose.

Please let me know if you agree this satisfy the request.

Getch

---------- Forwarded message ----------
From: **Raley, Keith** <keith_c_raley@nbc.gov>
Date: Tue, Dec 4, 2012 at 1:45 PM
Subject: Re: FOIA Request
To: "Laraway, Leslie" <leslie_laraway@nbc.gov>
Cc: "Getchell, Ralph" <ralph_getchell@nbc.gov>, Rick Gividen <John_R_Gividen@nbc.gov>

Getch,

I can't find the email I sent Stew but I seem to recall that they are asking for military classifications of mishaps which is not what we use. There have been 3 known mishaps involving DOI UAS.

1. Raven A struck student in shoulder during landing sequence at a UAS initial training event with a student at the controls. There were no serious injuries nor did they require any medical treatment.

2. Raven A suffered a servo hard over during a training flight that prevented the operator from maintaining control resulting in a high angle impact. The aircraft was retired as a result of the damage.

3. Raven A was lost while maneuvering to avoid a manned aircraft while conducting a dam survey. The operator failed to make the appropriate control inputs as a result of mode confusion and ultimately allowed the aircraft to impact 200'+ tall trees. The operator was unable to locate the aircraft due to the terrain and vegetation.

I believe we had the discussion about the cost being $0 as they were planned to destroyed by the Army.

Let me know if you need anything else.

On Tue, Dec 4, 2012 at 12:54 PM, Laraway, Leslie <leslie_laraway@nbc.gov> wrote:

> I anxiously be waiting... I told Mark you both had submitted your info to Stew more than a week ago. He definitely wants all that info today, if humanely possible.
>
> On Tue, Dec 4, 2012 at 12:43 PM, Getchell, Ralph <ralph_getchell@nbc.gov>

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1. Raven A struck student in shoulder during landing sequence at a UAS initial training event with a student at the controls. There were no serious injuries nor did they require any medical treatment.

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Here are the total hours DOI flew the two models of UAS's that we have in our inventory.

	FY 11	FY 12
Raven A	54.8	74.7
THawkIII	0	13.0